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TITLE: Spectral properties of icy satellites

ABSTRACT BODY:

Abstract Body: Since 2004 Cassini is orbiting the Saturnian system with its instruments investigating the chemical and physical properties of Saturn ‘s atmosphere, its magnetosphere, its numerous satellites and rings. The VIMS instrument onboard Cassini enables not only to identify the Saturn satellites’ compositional units but also to map their distribution across the surfaces, to relate their location and extension to specific geological and/or geomorphological surface features and to characterize surface alterations induced by the space environment. Although, the VIMS spectra of the Saturnian satellites’ surfaces are dominated by H_2O-ice, its distribution and physical characteristics differ distinctly from one satellite to the other. Global hemispherical differences are mostly related to the satellite’s orbital position within the Saturnian system, i.e. the distance to Saturn and its E ring, with particles originating from Saturn’s magnetosphere and/or the ice grains coming from the E ring impacting their surfaces. Often, these hemispherical differences are characterized by a dark non-icy contaminant more concentrated on their trailing hemispheres, while the more water ice-rich leading hemispheres appear covered by fresh material ejected by an impact event and/or by impacting E-ring particles. Tethys, however, situated closer to Enceladus and the E ring and deeper within Saturn’s magnetosphere, shows a more complex pattern. Compositional changes on a regional and local scale could be identified and related to the geological processes, i.e. impact cratering, tectonics, and erosion. Particularly, young impact craters and tectonic features reveal clean H_2O ice of relatively large grain size while the “fresh” (unaltered) surface material offers a unique view into the crustal properties and evolution of its satellite. Whereas, prominent graben systems on Dione and Rhea are characterized by a pronounced ice signature – Ithaca Chasma on Tethys is barely recognizable in the VIMS data – its signature is either masked or indicates a higher geological age than tectonics on Dione and Rhea. Furthermore, VIMS results do not support a formation of Ithaca Chasma due to the Odysseus impact event.

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